Fourth Edition

ESSENTIALS OF FIRE FIGHTING

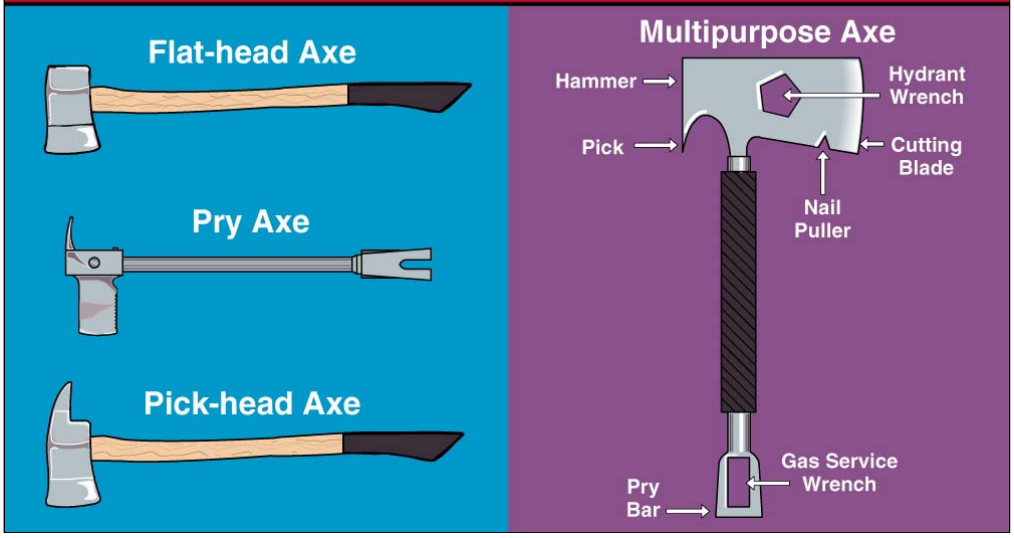
CURRICULUM PRESENTATION

FIREFIGHTER I • LESSON 8A

Fire Protection Publications
Oklahoma State University

CUTTING TOOLS: AXES

8A-1



PICK-HEAD AXE

- Comes with either a 6-lb or 8-lb head *(3 kg or 3.6 kg)*
- Has handle made of wood or fiberglass
- Is effective for cutting through wood, shingles, and other natural and lightweight materials

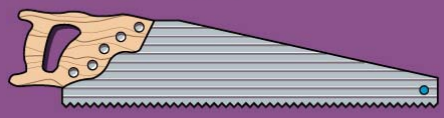
FLAT-HEAD AXE

- Comes with either 6- or 8-lb head *(3 kg or 3.6 kg)*
- Has handle made of wood or fiberglass
- Cuts through a variety of natural materials
- Can also be used as a striking tool

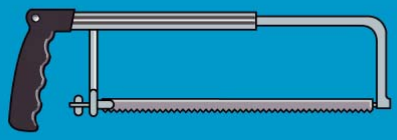
CUTTING TOOLS: HANDSAWS

8A-2

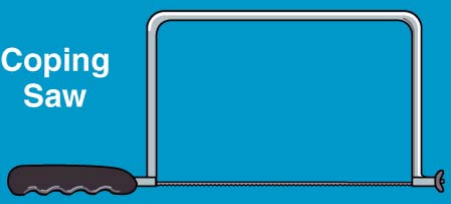
Carpenter's Saw



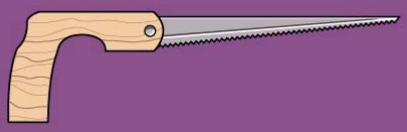
Hacksaw



Coping Saw

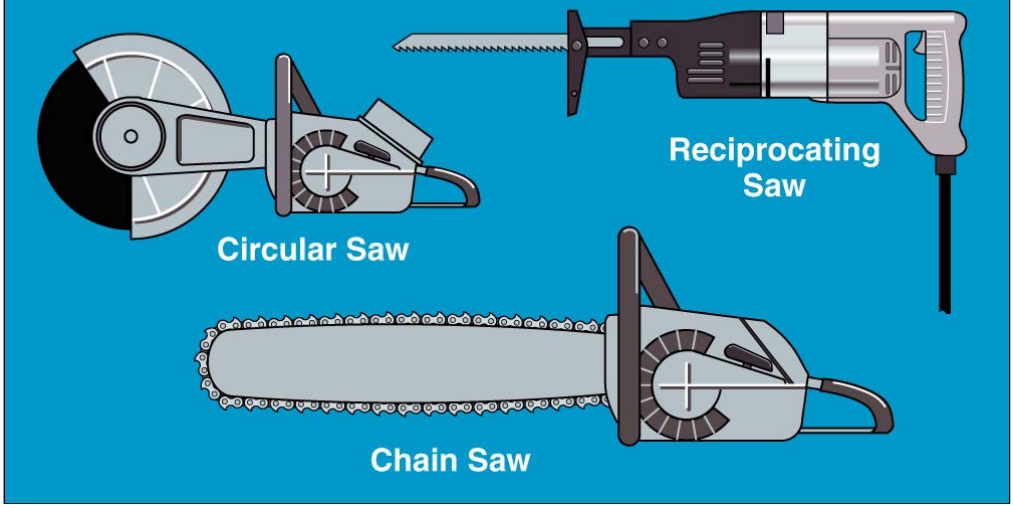


Keyhole Saw



CUTTING TOOLS: POWER SAWS

8A-3



POWER SAWS

- **Rotary (circular) saw**
  - Is most often gasoline powered and has changeable blades
  - Often spins blades more than 6,000 rpm
- **Reciprocating saw**
  - Is powerful, versatile, and highly controllable
  - Requires electricity, which may not be readily available

POWER SAWS (cont.)

- **Chain saw**
  - Has been used for years by the logging industry
  - Is finding a place in the fire service, especially during natural disasters
- **Ventilation saw**
  - Is more efficient than rotary saw
  - Is sometimes overlooked, because it is a newcomer

POWER SAW CAUTIONS

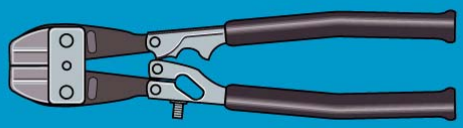
- Do not push a saw beyond the limits of its design and purpose.
- Never use a power saw in a flammable atmosphere.
- Always use eye protection when operating any power saw.

METAL-CUTTING TOOLS

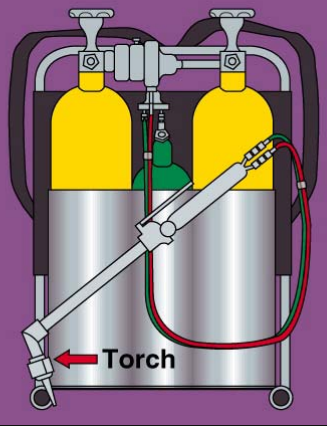
8A-4

Bolt Cutters

Wire Cutters



Oxyacetylene Outfit (Backpack Style)

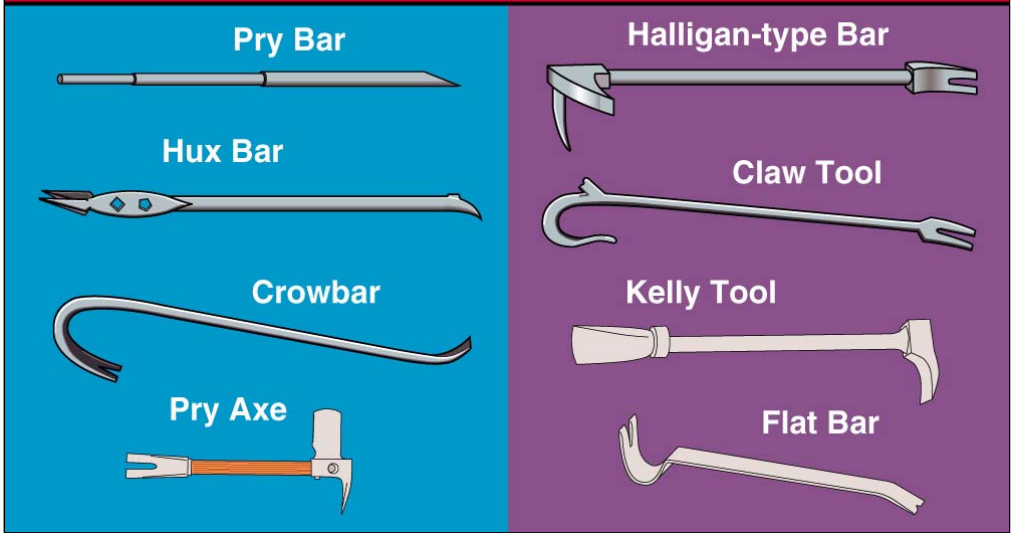


METAL CUTTING DEVICES & CUTTING TORCHES

- **Bolt cutters**
  - Have been used for many years in forcible entry
  - Are becoming outdated due to advances in security
- **Cutting torches**
  - May be necessary where high-security devices are used
  - Operate by burning away material being cut

MANUAL PRYING TOOLS

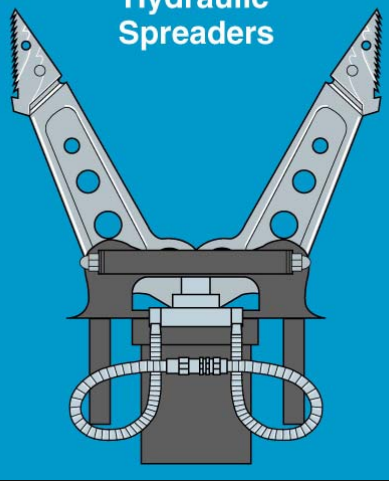
8A-5



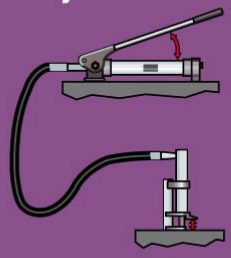
HYDRAULIC PRYING TOOLS

8A-6

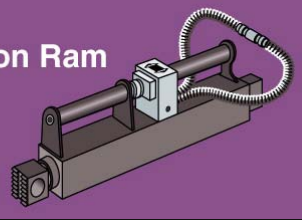
Hydraulic Spreaders



Hydraulic Door Opener



Extension Ram



HYDRAULIC RESCUE TOOLS

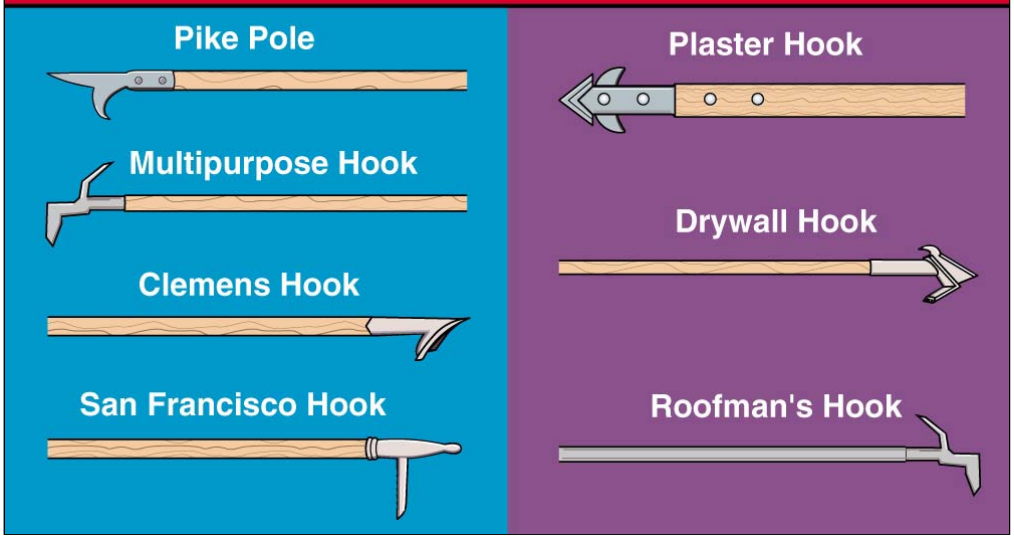
- **Hydraulic spreader —** Can spread as much as 32 inches *(813 mm)*
- **Hydraulic ram —** Has spreading capabilities ranging from 36 inches *(900 mm)* to 63 inches *(1 600 mm)*

HYDRAULIC DOOR OPENER

- Is lightweight and extremely valuable when more than one door must be forced quickly
- Can place firefighter in dangerous position if not used according to manufacturers' recommendations

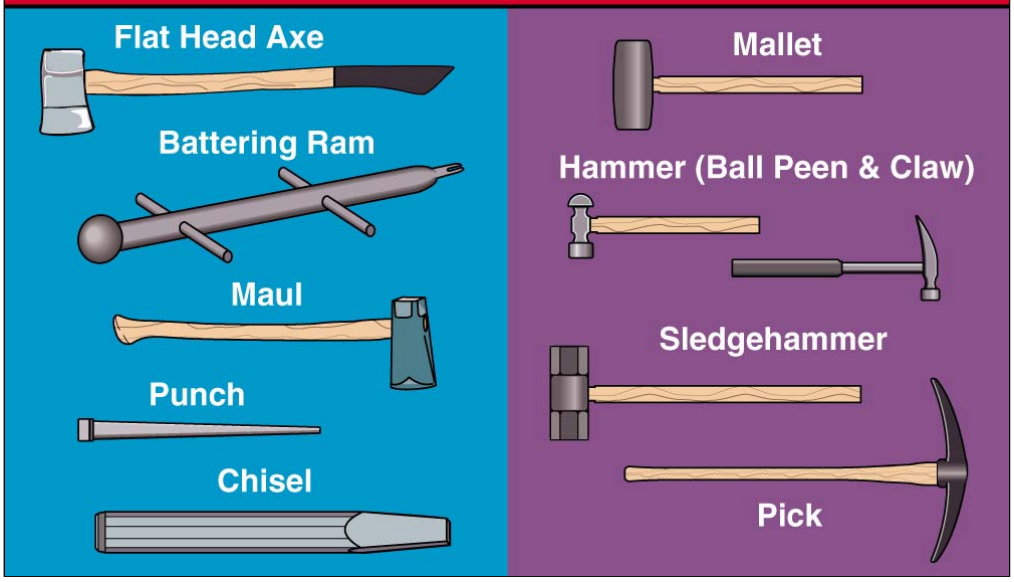
MANUAL PUSHING/PULLING TOOLS

8A-7



STRIKING TOOLS

8A-8



TOOLS USED FOR THROUGH-THE LOCK ENTRY

K-Tool

Key Tool

A-Tool

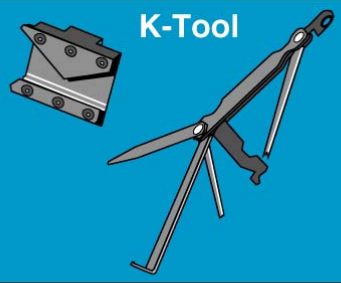
J-Tool

Shove Knife

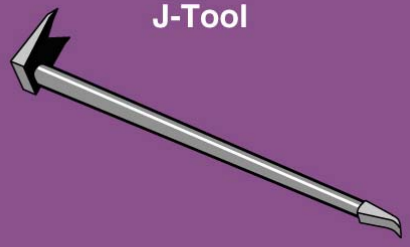
TOOLS FOR FORCING LOCKS

8A-9

K-Tool

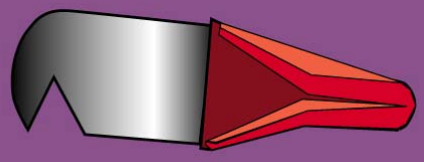


J-Tool



A-Tool

Shove Knife



TOOLS USED FOR BREAKING PADLOCKS

Duck-billed Lock Breaker

Hammerhead Pick

Locking Pliers and Chain

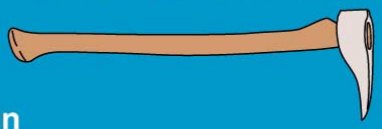
Hockey Puck Lock Breaker

Bam-Bam Tool

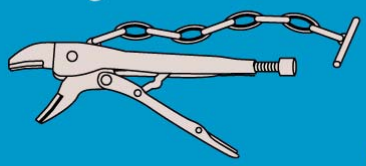
TOOLS FOR BREAKING PADLOCKS 8A-10

Duck-Billed Lock Breaker

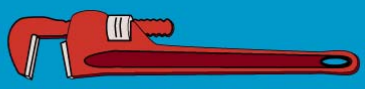
Hammerheaded Pick



Locking Pliers and Chain



Bam-Bam Tool



Hockey Puck Lock Breaker

PRYING TOOL & CIRCULAR SAW SAFETY

- **Prying tool safety**
  - Never use a “cheater bar” to provide additional leverage.
  - Never use a prying tool as a striking tool unless designed for that purpose.
- **Circular saw safety**
  - Do not interchange blades from different manufacturers.
  - Do not store blades in any compartment where gasoline fumes accumulate.

POWER SAW SAFETY

- Always keep safety guards in place.
- Match saw to task and material to be cut.
- Always wear proper PPE, including gloves and eye protection.
- Do not use any power saw in a flammable atmosphere or near flammable liquids.
- Keep unprotected and nonessential people out of work area.
- Follow manufacturer's guidelines for proper operation.
- Keep blades and chains well sharpened.
- Be aware of hidden hazards (electrical wires, gas lines, water lines, etc.).

TS 8A–12a

CARRYING TOOLS SAFELY

- **Axes —** Carry blade away from body.
- **Prying tools —** Carry pointed or sharp edges away from body.
- **Tool combinations —** Carry strapped together.
- **Striking tools —** Carry head close to ground.
- **Power tools —** Never carry an energized power tool.

CARRYING TOOLS SAFELY (cont.)

- **Pike poles and hooks**
  - **Outside structure**
    - ✓Tool head down, close to ground.
    - ✓Tool head ahead of body.
  - **Entering structure**
    - ✓Tool head upright.
    - ✓Tool close to body.

CARE & MAINTENANCE OF WOOD HANDLES

- Inspect for cracks, blisters, or splinters.
- Sand to minimize hand injuries.
- Wash with mild detergent, rinse, and wipe dry.
- Check tightness of tool head.
- Apply a coat of boiled linseed oil to prevent roughness and warping.
- Limit tool marking (such as company identification, department name).

CARE & MAINTENANCE OF FIBERGLASS HANDLES & CUTTING EDGES

- **Fiberglass Handles**
  - Wash with mild detergent, rinse, and wipe dry.
  - Check tightness of tool head.
- **Cutting Edges**
  - Inspect for nicks, tears, or metal spurs.
  - Replace when required.
  - File by hand; grinding weakens the tool.

CARE & MAINTENANCE OF PLATED SURFACES & AXE HEADS

- **Plated surfaces**
  - Inspect for damage.
  - Wipe clean, or wash with mild detergent and water.
- **Axe heads**
  - Keep sharp.
  - Do not paint.

CARE & MAINTENANCE OF UNPROTECTED METAL SURFACES

- Keep free of rust.
- Oil lightly.
- Avoid painting.
- Inspect for spurs, burrs, or sharp edges, and file them off when found.

CARE & MAINTENANCE OF POWER EQUIPMENT

- Read and follow manufacturers' instructions.
- Inspect and ensure power tools will start manually.
- Check blades for completeness and readiness.
- Replace worn blades.
- Check all electrical components for cuts and frays.
- Ensure that all guards are functional and in place.
- Ensure that fuel is fresh.

CARE & MAINTENANCE OF SAW BLADES

- Keep clean.
- Keep sharp.
- Keep lightly oiled.
- Do not interchange different manufacturers' blades (power saws).
- Store in a clean, dry place.
- Do not store where gasoline fumes accumulate (composite blades).

GENERAL CAUTIONS & PROCEDURES

- Try before you pry.
- Carry tools safely.
- Use tools safely.
- Use the right tool for the job.
- Keep tools clean.
- Maintain and store tools properly.
- Do not remove power tool safety guards.

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Fourth Edition

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FIREFIGHTER I • LESSON 8B

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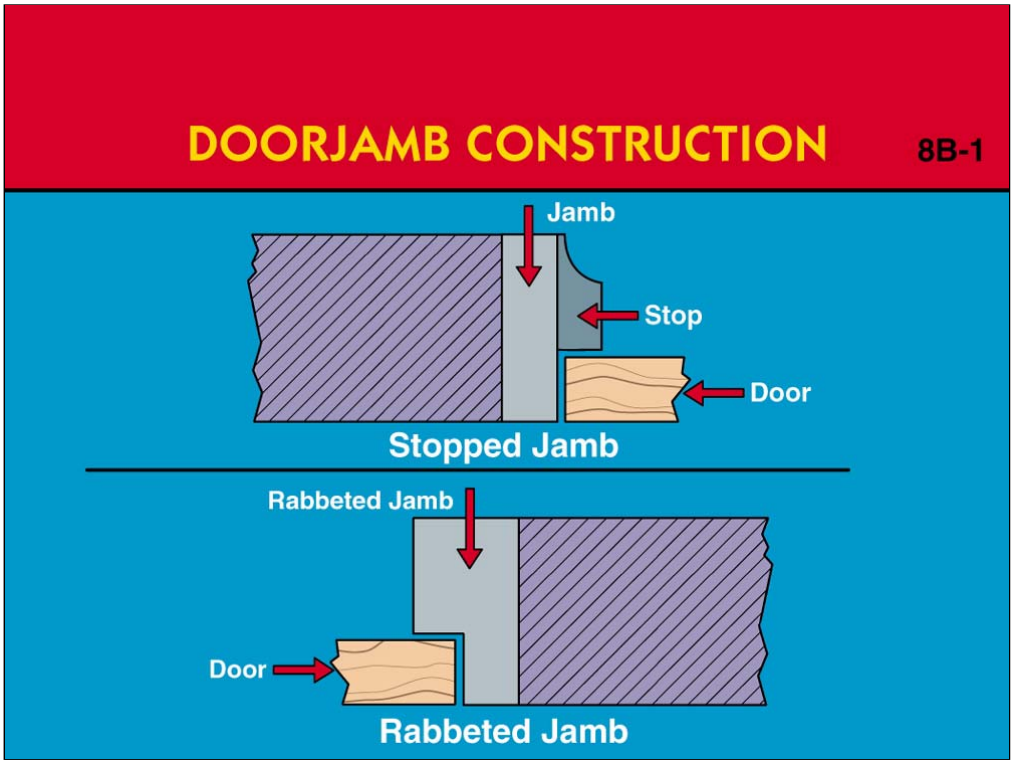
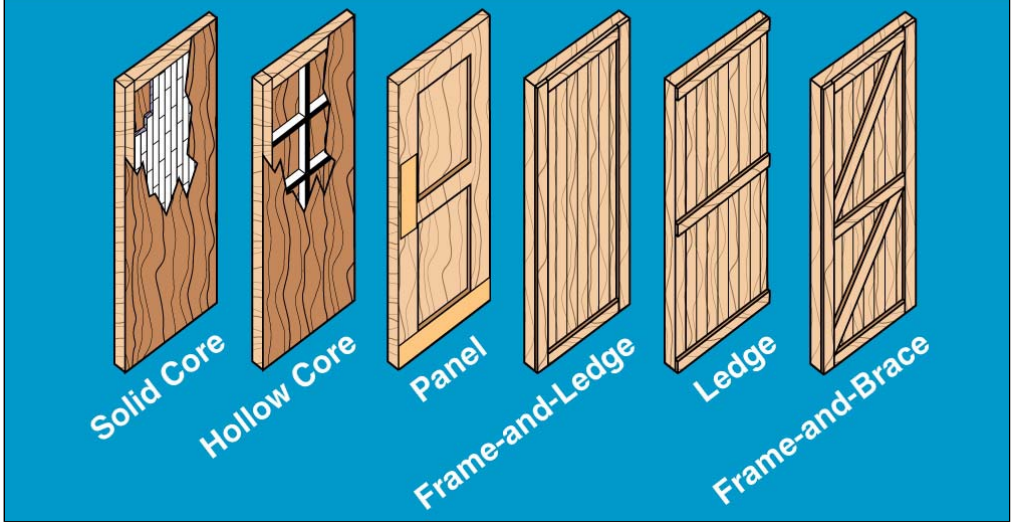
DOORJAMB CONSTRUCTION

8B-1



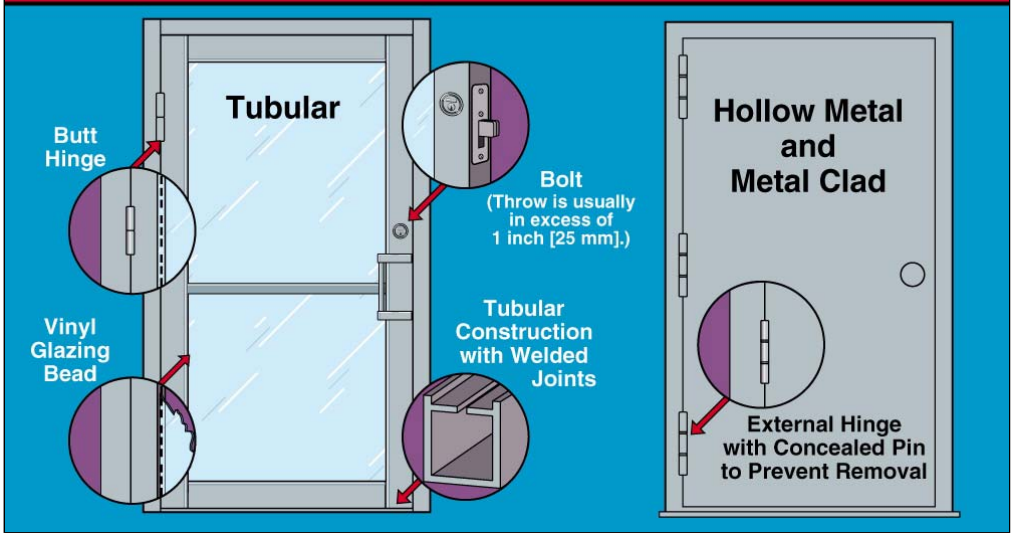
WOOD DOOR CONSTRUCTION

8B-2



METAL DOOR CONSTRUCTION

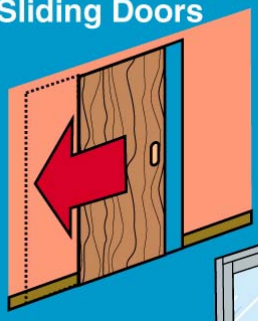
8B-3



SLIDING DOORS & REVOLVING DOORS

8B-4

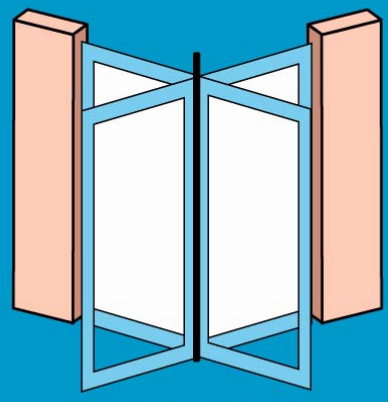
Sliding Doors



Pocket Door

Sliding Patio Doors

Revolving Doors



Generic Revolving Door

REVOLVING DOORS

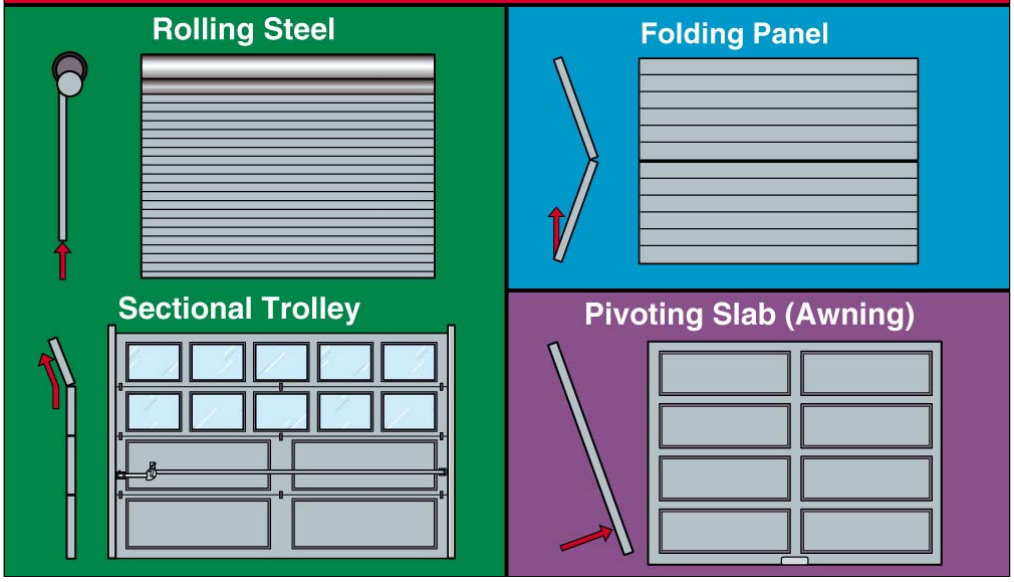
- Are made up of quadrants of glass door panels that revolve around a center shaft
- Are difficult to force when locked — it is more effective to force through a swinging door on either side of the revolving door

COLLAPSE MECHANISMS OF REVOLVING DOORS

- **Panic-proof type —** Is triggered by forces pushing in opposite directions on the quadrants
- **Drop-arm type —** Is collapsed by pressing the pawl to disengage the arm, then pushing the quadrant to one side
- **Metal-braced type —** Is collapsed by lifting the "gate hook" assembly and fastening it back against the fixed quadrant; hooks are located on both sides of the quadrant

OVERHEAD DOOR TYPES

8B-5



TYPES OF FIRE DOORS

Horizontal & Vertical Sliding

Single & Double Swinging

Overhead Rolling

FIRE DOOR OPERATION

Fire doors may be mechanically, manually, or electrically operated.

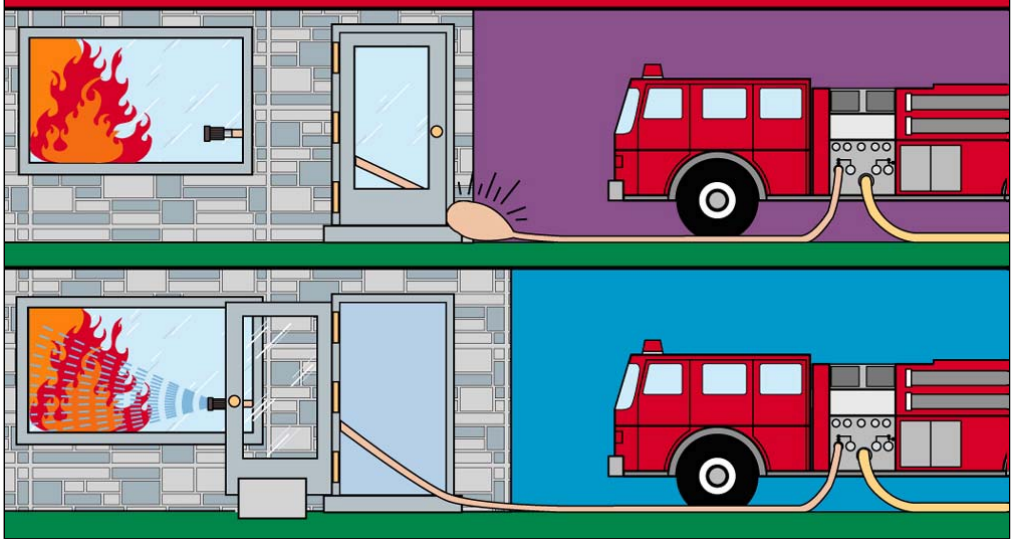
- Self-closing — Returns to closed position on its own
- Automatic-closing — Closes when the hold-open device releases door upon smoke detector or alarm activation

FORCING FIRE DOORS

- **Interior fire doors rarely lock when they close.**
- **Exterior fire openings may lock.**
- **Firefighters should always block open doors.**
  - Cannot warp or stick and trap the firefighter
  - Cannot close and lock, prohibiting other firefighters from entering structure
  - Cannot close and cut off hoseline water supply

BLOCK DOORS OPEN!

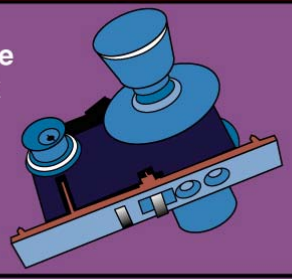
8B-6



LOCKS & LOCKING DEVICES

8B-7

Mortise Lock



Bored (Cylindrical) Lock

Rim Lock

Padlock

FORCIBLE ENTRY TECHNIQUES FOR LOCKS & LOCKING DEVICES

- Unscrew the lock cylinder.
- Pull the lock cylinder.
- Break or cut the padlock.

NONDESTRUCTIVE RAPID-ENTRY METHOD

- Rapid-entry key box system
- Key box holds all necessary building keys
- Is opened only by a fire department's master key

GUIDELINES FOR OPENING DOORS

- Try before you pry!
- Examine construction.
- Determine method of operation.
- Examine lock.
- Force? Find other method of entry?
- Use easiest, least damaging method.

SIX BASIC METHODS OF FORCING A DOOR

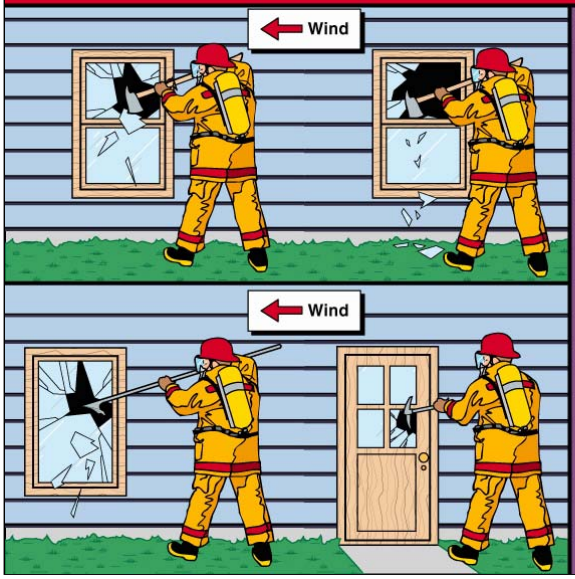
- Removing the hinge pins
- Breaking the glass and unlocking from inside
- Breaking the lock
- Prying the door and jamb apart
- Cutting an entry hole
- Battering the door down

TYPES OF GLAZING MATERIALS

- Plate glass
- Tempered plate glass
- Lexan®
- Thermopane®
- Plexiglas®
- Glass containing wire mesh
- Double- and triple-pane windows
- Double-paned windows with blinds sandwiched and sealed between them

BREAKING GLASS

8B-8



- Stand to windward side.
- Use a tool.
- Strike at top of pane.
- Keep hands above point of impact.
- Wear protective clothing.

FALLING GLASS HAZARDS

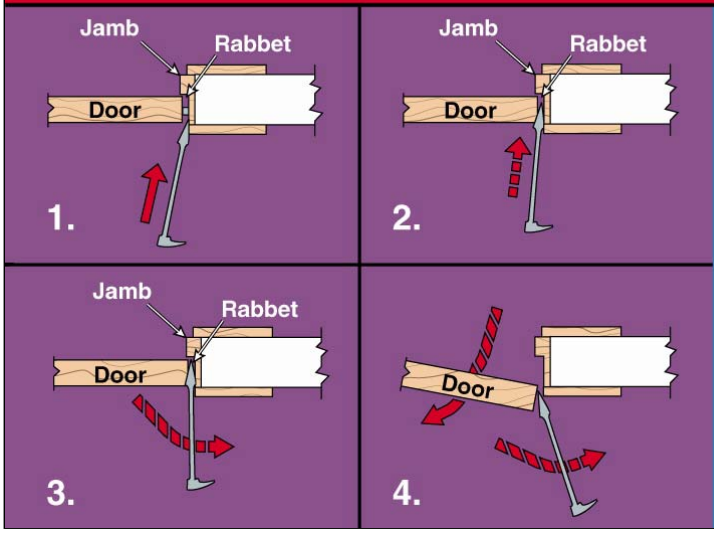
8B-9

Take special precautions when breaking glass above the ground floor.

Wind may cause heavy shards of glass to travel great distances.

FORCING DOORS THAT OPEN TOWARD YOU (RABBETED JAMB)

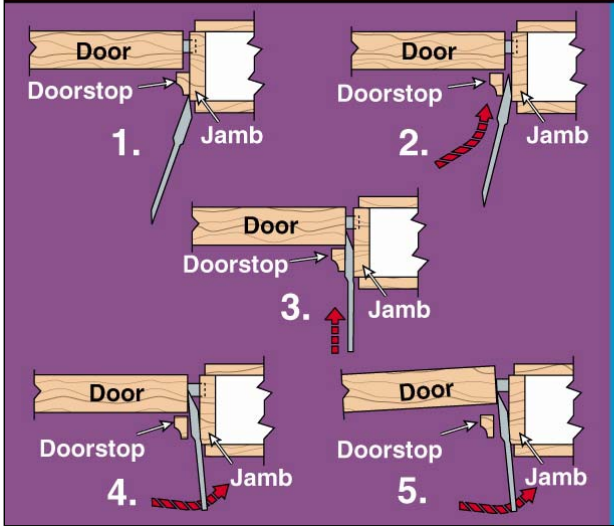
8B-10



1. Insert blade between door and jamb just above or below lock.
2. Force blade against rabbet.
3. Push bar away from door.
4. When lock clears the keeper, open the door.

FORCING DOORS THAT OPEN AWAY FROM YOU (STOPPED JAMB)

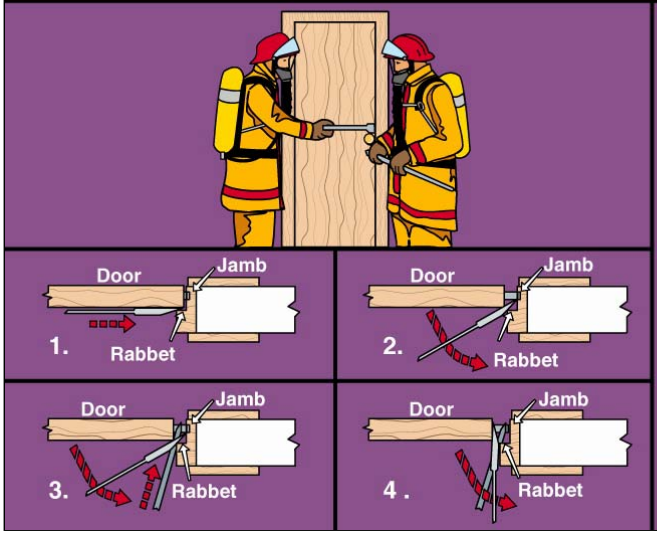
8B-11



1. Insert blade between doorstop and jamb just above or below lock.
2. Remove or loosen doorstop at the lock.
3. Start the blade between the door and jamb.
4. Make initial pry when blade is halfway in.
5. With full bite, pry until the bolt passes the keeper, and then push the door open.

FORCING A DOOR WITH TWO TOOLS (RABBETED JAMB)

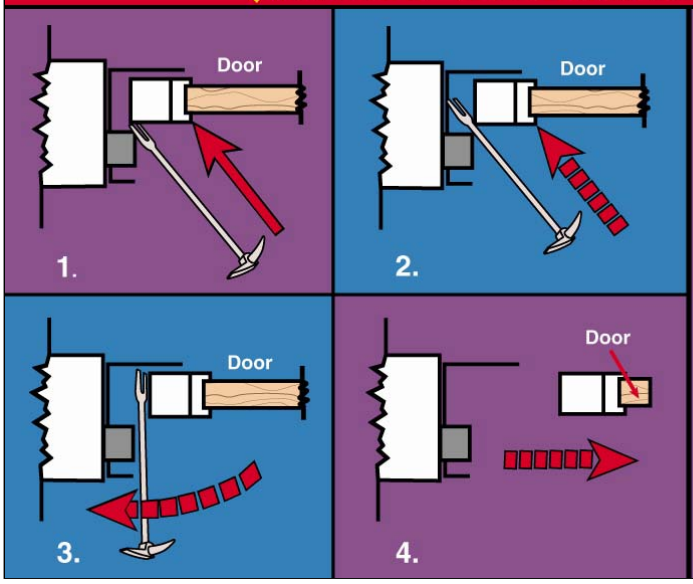
8B-12



1. With blade flat against door, insert the blade between the rabbet and the door just above or below lock.
2. With blade between door and jamb, make short pries.
3. Insert second tool well into opening.
4. With full bite behind the door, pry the door away from the jamb.

FORCING SLIDING DOORS
(WITHOUT BURGLAR BARS)

8B-13

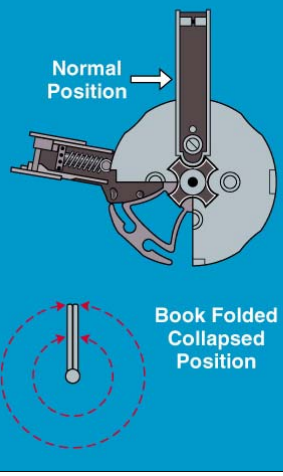


1. Insert wedge tool between door and jamb, just above or below lock.
2. Force blade against door frame.
3. Pry door straight back from lock.
4. When lock clears latch, slide door open.

TYPES OF REVOLVING DOOR COLLAPSIBLE MECHANISMS

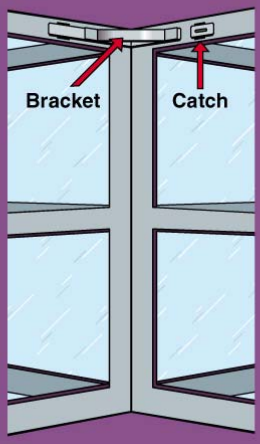
8B-14

Panic-Proof

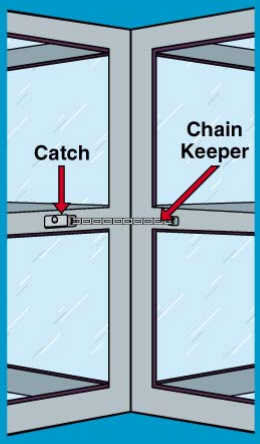


Book Folded Collapsed Position

Drop-Arm

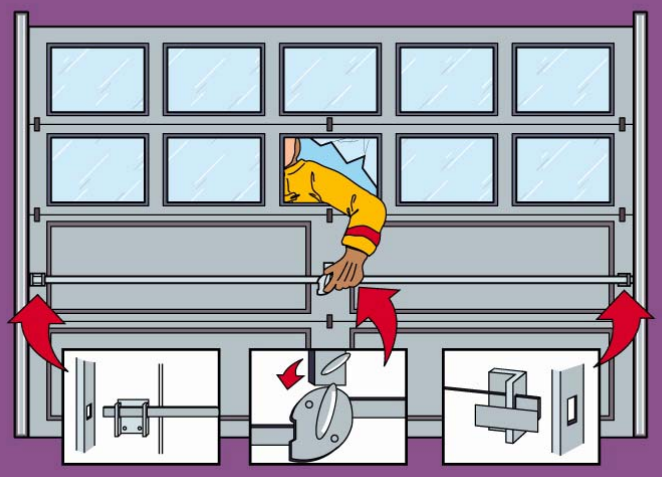


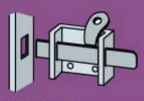
Metal-Braced



OVERHEAD DOOR LOCKS & LATCHES

8B-15





Side Lock

Center Latch

Side Lock and Latch

FORCIBLE ENTRY
SPECIAL CIRCUMSTANCES

The following circumstances may require additional measures due to building construction features, door construction, or higher security.

Double Swinging Doors

Drop Bars

Tempered Plate Glass

THROUGH-THE-LOCK FORCIBLE ENTRY TOOLS

K-Tool

Key Tool

A-Tool

J-Tool

Shove Knife

SPECIAL TOOLS & TECHNIQUES FOR PADLOCKS

- **Duck-billed lock breaker —** Wedge-shaped tool that widens and breaks padlock shackles
- **Bam-bam tool —** Tool that drives case-hardened screws into a padlock's keyway lock mechanism
- **Saws or cutting torches —** Method of cutting padlocks

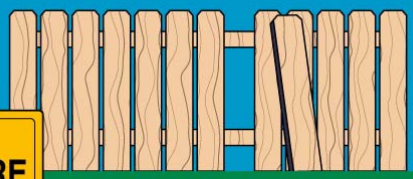
FENCES

8B-16

Padlocked Gate in Chain-link Fence

Cut or force the padlock.

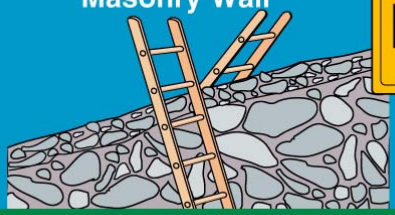
Board Fence



Pry off boards.

BEWARE OF DOG!

Masonry Wall



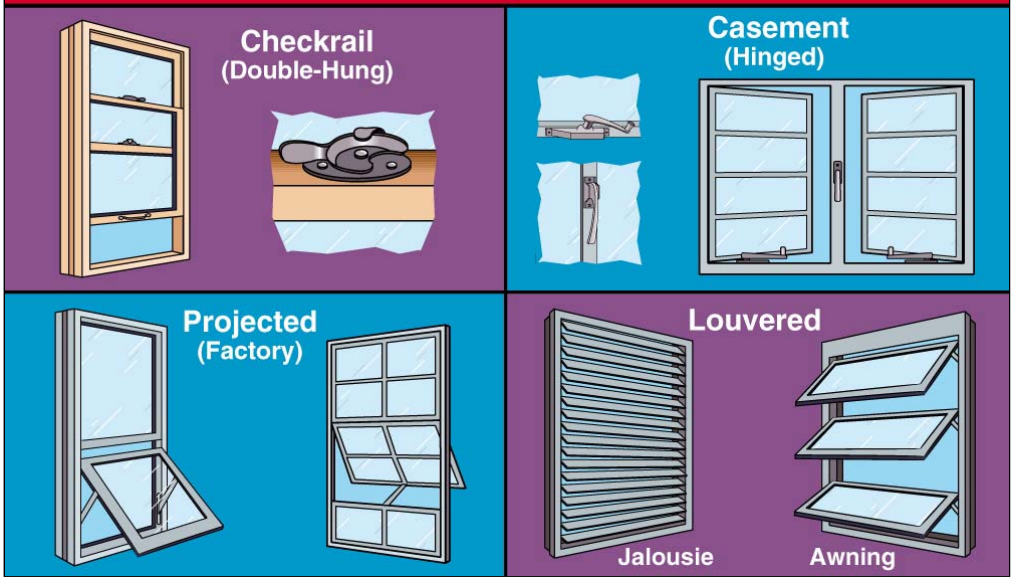
Ladder the wall.

Wire Fence

Use wire cutters near post.

WINDOW CONSTRUCTION

8B-17



FORCING DOUBLE-HUNG (CHECKRAIL) WINDOWS

- Insert axe blade or prying tool under center of bottom sash, in line with lock mechanism.
- Pry upward to force the screws out of the lock.
- Open the window.

FORCING HINGED (CASEMENT) WINDOWS

- Break the lowest pane of glass.
- Clean out the sharp edges.
- Force or cut the screen in the same area.
- Reach in and upward to unlock the latch.
- Operate the cranks or levers at the bottom.
- Completely remove the screen, and enter.

PROJECTED (FACTORY) WINDOWS

- Are forced in the same way that casement windows are forced
- May require use of a power saw or cutting torch to cut the window frame and enlarge the opening
- Are classified by the way that they swing when opened
  - Projected-in
  - Projected-out
  - Pivoted-projected

AWNING & JALOUSIE WINDOWS

- Are most difficult to force
- Require removal of several panels to permit entry

LEXAN® WINDOWS

- **Require rotary power saw with a carbide-tipped, medium-toothed blade**
  - Large-toothed blades skid off the surface
  - Smaller toothed blades will melt the Lexan® and cause the blade to bind
- **Will shatter when intense cold is combined with the sharp blow**

One technique is to discharge a CO_2 fire extinguisher on the Lexan® window, and then immediately strike the pane.

FORCING BARRED OR SCREENED WINDOWS & OPENINGS

- Shear all the bolt heads off and remove the screen or bars.
- Cut bar assembly using a rotary power saw fitted with a metal cutting blade.
- Cut bar assembly or screen from the building using an oxyacetylene torch.

TYPES OF WALL CONSTRUCTION

Masonry

Veneer

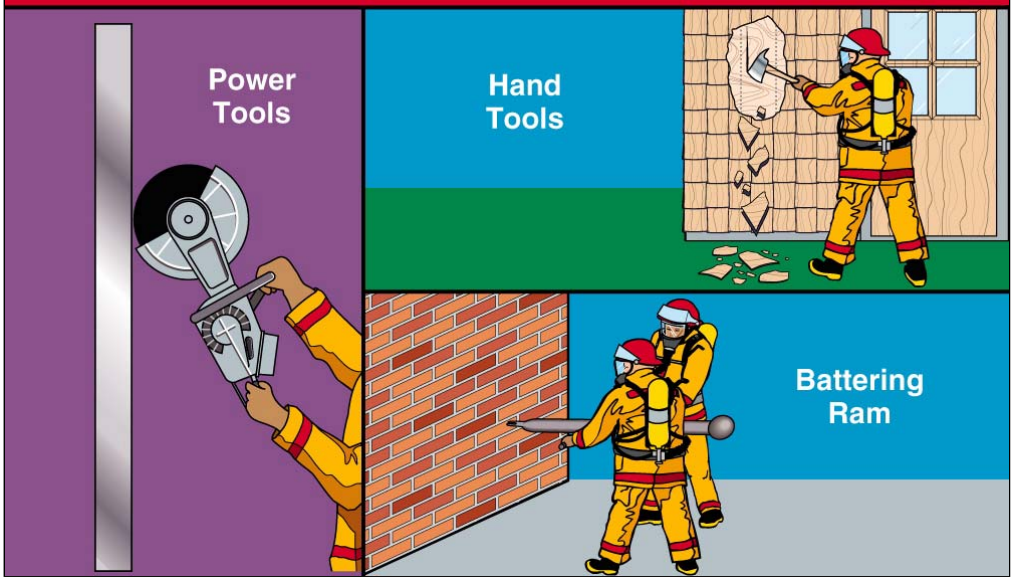
Metal

Wood-frame

Partition

OPENING WALLS

8B-18



BREACHING PLASTER OR GYPSUM PARTITION WALLS

- Select location of opening.
- Check wall for electric wall plugs and switches.
- Have available a wide variety of forcible entry tools, including hand and power tools.
- Sound wall to locate studs.
- Cut along studs to make a large opening.
- Remove one stud, if possible, from center of breach to enlarge opening for firefighters to pass.
- Use breach to gain access to area; then search to find normal means of entry.

BREACHING BRICK, CONCRETE BLOCK, & METAL WALLS

BRICK/CONCRETE BLOCK

- Use battering ram for best results.
- Use power tools:
  - Air chisels
  - Hydraulic spreaders
  - Rotary rescue saws with masonry blades

METAL WALLS

- Cut along studs with metal-cutting power saw.
- Fold metal back.

OPENING A WOOD FLOOR

8B-19

1. Sound for floor joists and cut one side of opening with angled cuts.

2. Cut other side of opening, and remove finished floor.

3. Repeat the process to remove subfloor.

BREACHING WOOD FLOORS

- **Construction factors**
  - Usual distance between joists
  - Composition and thickness of subfloors
  - Lay of subfloor in relation to joists
  - Finish flooring materials
  - Lay of finish floor in relation to joists
- **Methods and tools**
  - Remove carpets and rugs.
  - Make neat cuts between joists with power saw, circular saw, or a saber or chain saw.

BREACHING CONCRETE/ REINFORCED FLOORS

- **Methods**
  - Bypass cutting if possible.
  - Use a compressed-air or electric jackhammer.
- **Tool options**
  - Compressed-air or electric jackhammer
  - Power saw equipped with concrete cutting blades
  - Special-purpose nozzles

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Oklahoma State University
Stillwater, Oklahoma

Forcible Entry

- Name_____ID_____
- Date_____
- Rig/shift_____
- Captains signature_____

1. The firefighter shall list 10 different forcible entry tools carried by LFR. Y_____
2. The firefighter will state the uses of these 10 forcible entry tools. Y_____
3. The firefighter will demonstrate the proper method of breaking a window with an axe or a pike pole. Y_____
4. the firefighter shall discuss door and door jamb construction. Y_____
5. The firefighter shall discuss the methods of opening doors constructed of different materials. Y_____
6. The firefighter shall discuss the different types of windows and how to forcibly enter each one of these. Y_____